two right angles is manifestly in conflict with the doctrine of those metageometers who maintain that *the space in which we dwell* has constant, positive curvature and that the angle-sum of the rectilineal triangle drawn therein is greater than two right angles.

If it is maintained that the conclusions of Lobatschewsky, Riemann and Euclid are consistent with their respective premises, the question arises which of these systems is true. If any one does not really know which is right, confession of one's ignorance may be good for the soul, but can hardly be received as satisfactory evidence that the agnostic is in possession of geometrical science.

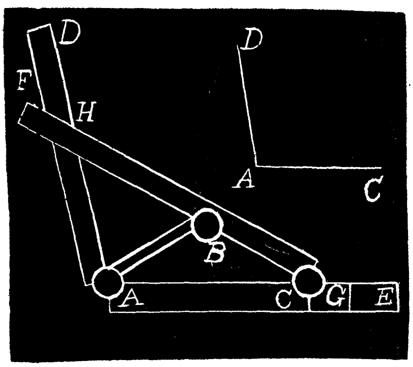
The hypothesis that Lobatschewsky, Euclid and Riemann all three tell the truth is confronted with the difficulty that they contradict each other.

Professor Halsted teaches as sound geometry the views of each of these three writers. I can not accept this teaching. If the Euclidian doctrine is true, according to logical law that which contradicts it must be false. This procedure of Professor Halsted antagonized the logical laws of non-contradiction and excluded Middle whether he is aware of it or not.

A TRISECTOR OF ANGLES.

By M. A. GRUBER, A. M., War Department, Washington, D. C.

Description. A, B, and C are centers and joints. G is a slide moving along the rule AE. The joint C is fixed to the slide so that the center C moves in the line AC. FC is a rule finely and accurately graduated from B to F, and fixed to the slide G by the joint C. AD is a fine and accurately graduated rule fixed to the rule AE by the joint A AB is a small rule jointed at A and B.



Line AB equals line BC, both remaining constant.

The *edges* of the rules for use are those radiating from the centers.

Use. It is desired to trisect the $\angle DAC$.

Place the center A of the trisector upon the vertex A of the angle, so that the edge AC of the rule AE coincides with the side AC of the angle. Then move the rule AD until the edge coincides with the side AD of the angle. Now move the slide G until BH on the rule FC equals AH on the rule AD. Then draw a line along edge of rule AB.

$\angle BAC=\frac{1}{3}\angle DAC$. Bisect $\angle DAB$ and the trisection is complete.

Proof. $BC=AB$ and $BH=AH$ by construction.

$\angle HBA=\angle BAC+\angle ACA=2\angle BAC$. But $\angle HBA=\angle HAB$.

$\therefore \quad \angle HAC=\angle HAB+\angle BAC=3\angle BAC$.

Within reasonable limits of length of the rules FC and AD, angles up to 120° can be trisected.

History. Last February four years ago, I was experimenting with triangles. I had drawn a rt.△ whose acute angles were 60° and 30°. By joining the vertex of the rt.∠ with the middle of the hypothenuse, I noticed that the rt.∠ was trisected. To devise an instrument for the trisection of any angle then engaged my mind for a few weeks, and the above device was the result.

I communicated my discovery to several mathematicians and inquired as to its practicability. The replies were not encouraging. One reason given was that an instrument with several joints and a slide, was not sufficiently accurate. The suggestion was also made that it would not pay to get it patented, as the trisecting of angles entered to a very limited extent in the mechanical applications.

Thinking that the readers of the AMERICAN MATHEMATICAL MONTHLY might be interested in this device, though it may be but a mathematical curiosity, I have given the foregoing brief sketch of it.

DIAGRAM FOR THE LAWS OF THE FALLING BODIES.

By Rev. A. L. GRIDLEY, Pastor of the Congregational Church, Kidder, Missouri.

Let the distance a body would fall in one second be represented by one of the small triangles in diagram as a. During the first second it would fall through the firstspace, or triangle at the apex. During the second second it would pass through three, as that is the number of triangles in the second space which is indicated by the figures at the right. During the two second it would pass through $3+1$ triangles$=4a$, or $2^2\times a$.

To illustrate farther. How far would a body fall during the 9thsecond of its descent?

Opposite the figure 9 on the left are 17 triangles so it would pass through 17 times the distance it did during the first second or $17a$. How far would it fall during the ninth second without increment?

Leave off the right hand triangle and there would remain 18 so it would fall $18a$.

What would be the velocity at, say, the end of the 8th second? It would be the distance it would fall during the 9th second without increment, or the triangle at right hand side,$=16a$.